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An Air Conditioning Engineer Builds a Home, by Esten Bolling.
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The Thermal Load Diagram, by Herman Vetter.
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Modern Air Conditioning Systems Increase Patronage of Older Hotels, by H. L. Branigin.
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The Lakeside Press Air Conditioned for Comfort of Personnel, by J. H. Bailey.
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Two-Hour Readings of Conditions Assist in Operation of Theater Air Conditioning, by Erwin L. Weber.
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Air Conditioning Movie Theaters, by Malcolm Tomlinson.
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Air Conditioning a Department Store, by E. H. Dafter.
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Interviews of Interest.
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"It's Not the Heat, But the Humidity."
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Air Conditioning and Furniture.
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Temperature and Humidity Control of an Oxygen Chamber, by John B. Hashagen.
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Air Conditioning for Diseases, by Charles Byrne.
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The Value of Air Conditioning for Persons Doing Physical Work in Dollars and Cents, by Malcolm Tomlinson.
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Static Electricity in Industry, by Edgar S. Miller.
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Humidity—Its Relation to Humanitarianism and Commercialism, by William M. Trafton.
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Operating a Woolen Mill Humidifying System Correctly, by James W. Cox, Jr.
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"Open for Discussion."
No. 9. September, 1930. *p.* 772.
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Proper Placing of Humidifier Controls in Cotton Mill Card Rooms Important, by James W. Cox, Jr.
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Humidity a Factor to Consider in Storage of Food Products, by Herman Vetter.
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Temperature, Humidity and Air Motion Affect Apples in Storage, by Clarence E. Baker.
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Improved Electrical Properties by Drying, by R. F. Morrison.
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Conditioned Air for Glue?, by Malcolm Tomlinson.
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Drying Lime in a Wire Mill.
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Manufacture and Proper Use of Wood Products Require Air Conditioning, by W. Le Roy Neubrech.
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Peak Load Must Be Considered in Design of Air Conditioning Systems, by G. L. Larson and C. Brantz.
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Determining Proper Air Conditions for Libraries, by R. F. Morrison.
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Air Conditioning—Ventilating

Decreased Death Rate of Poultry Represents Large Profit—Proper Air Conditions an Aid, by John H. Ruckman.
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"Open for Discussion."
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Testing Circulation of Air, by I. D. Mayer and C. E. Baker.
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Ventilating Rooms for Light Treatment.
No. 7. July, 1930. p. 633.
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Handling Kitchen Exhaust in an Apartment House, by Samuel R. Lewis.
No. 11. November, 1930. p. 929.
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Five Systems Ventilate Apartment-Museum, by Maria Sermolino.
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Master Apartment Hotel, New York, is first apartment-museum; five separate ventilation systems; air supply to auditorium; cold and hot water piping; fire protection piping; heated by vacuum system. 1 i.

Industrial Plants.

Ventilating and Heating Features of the Building Code of the Pacific Coast Building Officials' Conference.
No. 1. January, 1930. p. 90.
General ventilating requirements; garages; dry cleaning plants; motion picture machine booths; stage ventilators.

Removal of Corrosive Fumes.
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Office Buildings, Stores, Theaters, Churches.

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The Canal Bank & Trust Co. Building, New Orleans.
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Stopping a Fan Noise, by Louis L. Narowetz, Jr.
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Industrial Trust Company Building, Providence, R. I.
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No. 7. July, 1930. p. 627.
Interview with F. X. Thale on ventilation of Hardware Mutual Insurance Co. building at Stevens Point, Wis.; air inlets at ceiling; vacuum heating system used; plan. 1 i.

Downward Ventilation in Winter, Upward in Summer, for Temple Emanu-El, Conserves Fuel, by S. P. Moore.
No. 10. October, 1930. p. 825.
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"Open for Discussion," by S. Munson Corbett.
No. 3. March, 1930. p. 226.
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No. 3. March, 1930. p. 278.
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Interviews of Interest.
No. 4. April, 1930. p. 307.
Interview with H. W. Schmidt; school ventilation; tests made on two rooms of Wisconsin school; infiltration.

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No. 9. *September,* 1930. *p.* 780.
Interview with Charles R. Ammerman; air supply for chemistry building at University of Indiana; construction of ducts. 1 i.

Heating—General

Drying and Temporary Heating of Large Buildings, by John Howatt.
No. 1. *January,* 1930. *p.* 36.
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Electric Air Heating, by H. L. Stiles.
No. 2. *February,* 1930. *p.* 106.
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Natural gas used for heating in San Luis Obispo, Calif., instead of electricity; discussion on "Electric Air Heating," by H. L. Stiles, in February, 1930, issue, by W. D. Thurber.

Interviews of Interest.
No. 3. *March,* 1930. *p.* 278.
Heating research (interview with A. P. Kratz); actual heating effects of heating units being studied.

Open for Discussion.
No. 4. *April,* 1930. *p.* 321.
Sizing chimneys for tall buildings (also see October, 1929, issue); chart for sizing tall chimneys; sample problem checking chart. 1 i.

Heat Transfer Constants and Applications of Heat Transfer, by W. R. Woolrich and L. Holdredge.
No. 2. *February,* 1930. *p.* 127.
General applications of heat transfer; methods of heat transmission; fallacies and variables in heat data; the problem; heat requirements for incoming air; average air changes per hour for ventilation; heat requirements for heat loss; inside temperatures; heat loss through brick walls, concrete walls, stone walls, hollow tile walls, wood walls, doors and windows, roofing material, interior walls, ceilings and floors next to unheated space, and floors laid on ground; sample problem; supplementary heating; heat emission constants for heating surfaces; transmission from insulated surfaces; thickness of pipe covering to use.

Specifications for Heating and Ventilating, by Samuel R. Lewis.
No. 3. *March,* 1930. *p.* 199.
General conditions; prorating general expenses; drawings and symbols; permits; bond; insurance; extent of work; time; cleaning, protection; substitutions; guarantee; instructions and adjustments; shop drawings; temporary connections; heating during drying out; description of the plant; general construction work; grates, stokers, oil burners, etc.; boiler trimmings; hot water heater; breeching; pipe and fittings; supports; sleeves, plates, etc.; valves; traps; separators and oil filters; pumps; suction strainer; workmanship; gauges; oil tank setting; Hartford loop; vacuum traps for heavy duty. 4 i.

Specifications for Heating and Ventilating, by Samuel R. Lewis.
No. 5. *May,* 1930. *p.* 406.
Test of piping; insulation inside buildings; outside; fans; power transmission; motive power; sound proofing; convectors; direct and concealed heaters; partitions and housings; ducts, hoods, guards, dampers; registers, grilles, diffusers; ash and coal handling; thermometers and instruments; automatic control. 1 i.

"Open for Discussion."
No. 3. *March,* 1930. *p.* 226.
Comments (by S. R. Lewis) on the first three sections of the Code of Minimum Rrequirements, published by the *American Society of Heating and Ventilating Engineers;* minimum requirements for estimating heat for a building; amount of heat from steam and hot water radiators. 1 i.

"Open for Discussion."
No. 4. *April,* 1930. *p.* 324.
Discussion on Sections 4-7 of the A. S. H. V.. E. Code of Minimum Requirements, by Samuel R. Lewis; determining amount of indirect steam or hot water radiating surface; dampers and by-passes; definition of registers, grilles, etc.; notes on warm air furnace heating plants; design and installation of chimneys. 3 i.

"Open for Discussion."
No. 5. *May,* 1930. *p.* 419.
Comments on Sections 8 to 10 of the A. S. H. V. E. Code of Minimum Requirements, by Samuel R. Lewis; pipe sizes for low pressure heating systems; gravity and forced hot water heating systems; air ducts; dampers; measuring air velocities; installation of fans.

Investigation of the Heat Insulation Properties of Building Construction, by H. Krueger and A. Eriksson (reviewed by J. C. Peebles).
No. 7. *July,* 1930. *p.* 563.
Swedish investigators determine heat conductivity of concrete, frame, and brick construction and windows; two tests on cork; comparison with American methods; values obtained check A. S. H. V. E. values. 1 i.

Measurement of Air Temperatures, by Malcolm Tomlinson.
No. 9. *September,* 1930. *p.* 769.
Difficulties; effect of radiant heat; use of thermocouple; insulation of wires; surface leakage; kinds of thermocouples; accuracy. 1 i.

Suggested Reforms in Heating and Air Conditioning Nomenclature, by Samuel R. Lewis.
No. 9. *September,* 1930. *p.* 744.
Industry needs standard nomenclature; new terms suggested —elecon, elevent, fluecon, fancon, thermotrap, draft-head, direct-vent system, etc.; vacuum and vapor systems; filters; square foot and horsepower should be obsolete. 6 i.

"Open for Discussion."
No. 11. *November,* 1930. *p.* 941.
Discussion on "Suggested Reforms in Heating and Air Conditioning Nomenclature" (September, 1930, issue), by Edward B. Lewis and by Lee P. Hynes; unit of power; unit heater; convection heaters; square foot of radiation; Btu; difference between steam radiators and electric heaters; converting Btu's to kilowatts; revised nomenclature an aid.

Heating—District and Central (Including Underground Steam Piping)

Performance Data for Forty-seven University Buildings on North Carolina Campus, by I. W. Summerlin.
No. 12. *December,* 1930. *p.* 1021.
Early heating of University of North Carolina; present system; calculating heat losses; heating load on the central plant; majority of buildings heated by hot water; temperature control; underground mains; coal consumed; actual and theoretical fuel demands; power plant log; heating load curve for December, 1927; heating costs. 1927. 6 i.

First Stackless Building Erected in Chicago.
No. 1. *January,* 1930. *p.* 39.
Foreman National Bank heated from adjacent Conway Building; engineers claim no additional fuel necessary. 1 i.

Interviews of Interest.
No. 1. *January,* 1930. *p.* 88.
Central heating of government buildings; interview with George O. Vonnerta, office of the supervising architect; plants in operation in Washington, D. C.

Leak Indicators and Meters.
No. 3. *March,* 1930. *p.* 195.
Detecting leaks in underground piping; metering steam in railroad yards.

Underground Piping for District Heating, by A. A. Selike and G. D. Winans.
No. 5. *May,* 1930. *p.* 392.
Thorough study necessary; knowledge of methods of construction and installation of other utilities important; capacity of steam pipes; sample problem; graphical solution of Unwin's formula for pressure drop in pipes; piping standards of one company; detail of concrete conduit; kinds of pipe, cost per foot of conduit; service thimble; cast steel anchors; drainage; elongation of steel pipe; insulation; expansion; service piping; several factors influence transmission. 5 i.

Cell Concrete for Insulating Steam Lines, by A. G. Christie.
No. 6. *June,* 1930. *p.* 477.
Underground pipes insulated with cell concrete; method of applying; boiler breechings covered; patented process; method of mixing; weight; used as building blocks.

Sampling Pulverized Fuel.
No. 8. *August,* 1930. *p.* 648.
Method used at Trenton Channel plant.

Determining the Location of District Heating Mains, by John F. Collins, Jr.
No. 10. *October,* 1930. *p.* 817.
Necessity of careful study; municipal regulations; typical section of street; rules affecting location of mains; sidewalk vaults; minor obstructions; street crossings; preliminary office work; available data; surface survey; sub-surface survey; procedure used in Pittsburgh. 9 i.

Steam Piping for New District Heating System in Paris, by Phillippe Scherescheswsky.
No. 11. *November,* 1930. *p.* 914.
Characteristics of load; location of plants; steam from electric plants; length of mains; conduits; experimental systems. 4 i.

Heating—Hot Water, Steam, Vacuum, Vapor, Unit Heaters

Fuel Consumption in Toledo Schools, by Samuel R. Lewis.
No. 12. *December,* 1930. *p.* 997.
Types of heating systems used in Toledo schools; the buildings; fuel consumed in the various types; data analyzed; advantages of steel casings around brick settings. 5 i.

Notes on Heating and Piping in Germany, by Arthur K. Ohmes.
No. 1. *January,* 1930. *p.* 30.
"Union of the Heating Industry"; heating data available; central station heating; welding pipe in small trenches. 5 i.

The Effect of Two Types of Cast-Iron Steam Radiators on Air Temperatures in Room Heating, by A. C. Willard and M. K. Fahnestock.
No. 3. *March,* 1930. *p.* 185.
Factors studied at University of Illinois in connection with steam radiators; description of rooms and radiators tested; conditions; equipment used; sample data sheet; results of investigations; conclusions; recommendations; air temperature gradients from floor to ceiling. 6 i.

Low Pressure Steam Characteristics and Steam Flow and Typical Calculations, by W. R. Woolrich and L. Holdredge.
No. 5. *May,* 1930. *p.* 397.
Total heat of steam; boiling points; temperature differences for radiators in 70 F rooms at various steam pressures; heat of liquid, latent heat, and total heat of steam; temperature differences inside and outside radiators; steam quality; specific heat of superheated steam; total heat values for different degrees of superheat at low pressures; measurements of evaporation; boiler horsepower; method of calculating; factor of evaporation chart; correcting for quality; flow of steam through pipes; formula; correction factors; graphical solution for flow; typical computations. 9 i.

Calculating Radiation Requirements, by W. R. Woolrich and L. Holdredge.
No. 4. *April,* 1930. *p.* 291.
"Rule-of-thumb" methods cause errors; heat emitted by direct radiation (steam and hot water); heat emitted by pipe and ceiling coils; rated surface of standard sizes of radiation; comparison of rules for figuring radiation; Mills' rule; modified Mills' rule; Baldwin's rule; heat balance method; comparison for northern and southern location; hot water radiation requirements; correction factors. 16 i.

"Open for Discussion."
No. 7. July, 1930. p. 597.
Computing radiation; discussion by G. L. Larson on "Calculating Radiation Requirements," by W. R. Woolrich and L. Holdredge in April, 1930, issue; heat from occupants; heat balance method should be used; unit of heat output; computations for field house at University of Wisconsin.

"Open for Discussion."
No. 6. June, 1930. p. 494.
Comments on design of radiators, by Malcolm Tomlinson; radiant and convected heat; early experiments; rating and characteristics of radiators.

How to Make Nozzle Tests of Vacuum Pumps, by S. B. Redfield.
No. 10. October, 1930. p. 844.
Measuring air handling capacity of vacuum pumps; low ratio nozzle tests; shape of nozzle; set up of apparatus; figuring quantity of air; results plotted; slide-rule formula; atmospheric volumetric efficiency; approximate performance determinations and their uses; rotary pumps—hurling water type. 6 i.

Hotels, Apartments.

The Beresford Apartments, New York.
No. 1. January, 1930. p. 32.
Heating system; expansion loops. 1 i.

Engineering Analysis Saves Over $300.00 per Day in Operating Hotel Plant, by Samuel R. Lewis.
No. 8. August, 1930. p. 649.
Complete analysis essential on all jobs; plant first used oil, then natural gas, then coal; section of boiler, coal bunker; generation of electricity; plan of coal conveyor. 5 i.

Mechanical Equipment of New Y. M. C. A. Building Typical of Best Practice, by Robert P. Schoenijahn.
No. 11. November, 1930. p. 893.
Incorporates features of a hotel, home, social center, athletic club, church, school; new Y. M. C. A. in Wilmington, Del.; two steel boilers; motor-driven, underfeed stokers; ratings and accessories; coal used; boiler room piping and return mains; steel manifolds; vacuum heating system; pumps; estimating boiler demand; heating swimming pool water; hot water generators; all steam piping standard weight steel; testing piping; dripping mains; radiation; ventilating units; heating swimming pool room; temperature control; separate exhaust system for kitchen and cafeteria; plan of boiler room. 7 i.

Industrial Plants, Terminals.

Heating and Ventilating Delray Power House 3, by Sabin Crocker.
No. 5. May, 1930. p. 371.
Special problems in power plant heating and ventilating; summer conditions; heated air drawn off through monitor in roof; winter conditions; installing radiation; window sweeping system to prevent condensation and frost on windows; detail of air duct and outlet at window; other methods of preventing sweating unsuccessful; auxiliary turbine room ventilation; steam requirements; general features and layout of heating system. 5 i.

Heating a Fruit Terminal Presents Unusual Problems, by C. W. DeLand.
No. 7. July, 1930. p. 575.
Chicago Produce Terminal and Fruit Auction; size; frequent opening of freight door and cold fruit complicates problem; estimated heating capacity required; indirect system used; fuel used 1928-29; water-logged lines; temperature records kept; layout of system. 4 i.

Unit Heaters Prevent Condensation in Dye Houses, by John R. Cooper.
No. 9. September, 1930. p. 767.
Preventing condensation is a problem in air transportation; necessary air changes; a typical case; location of units; another installation; recirculating damper used. 2 i.

"Open for Discussion."
No. 10. October, 1930. p. 843.
Discussion on "Unit Heaters Prevent Condensation in Dye Houses" (September, 1930 issue) by John R. Cooper; air directions shown incorrectly in original article.

Fern Rock Car Shops Serve Philadelphia Subway—Mechanical Equipment of Interest, by Joseph Morgan Jr.
No. 10. October, 1930. p. 812.
Heating inspection shop; repair shops; fans; boiler plant; ash removal; headers; incinerator; correcting draft loss in stack; calculating fan sizes; hot blast and direct radiation. 9 i.

Interviews of Interest.
No. 10. October, 1930. p. 889.
Interview with O. A. Anderson, chief engineer, Armour & Co.; maintenance subject to budget; trends in design of power plants; saving steam.

Air from Generators Heats Power Plant, by Thomas J. Brett.
No. 11. November, 1930. p. 916.
Railroad power station heated by air passing through generators; cooled in summer; lay-out; ducts used. 1 i.

Office Buildings, Churches

Mechanical Equipment of the Koppers Building, by A. B. Whaley.
No. 4. April, 1930. p. 299.
Description of building; direct radiation; indirect radiation, and unit heaters used; description of each; water heating; ventilation; water supply. 5 i.

Rand Tower, Minneapolis.
No. 7. July, 1930. p. 555.
Heating system welded; number of welds; steam supplied from half-block away; mains; overhead system used; making holes for radiator branches; keeping roof drains open with bend on roof carrying steam; expansion joint built in wall; clamp for holding pipe when tack welding. 4 i.

Vacuum System Heats Royal Insurance Building, by William S. Gaylor.
No. 8. August, 1930. p. 647.
Up-feed vacuum return system takes steam from district heating mains for New York City office building; piping; ventilating; air washers and filters; washer chambers of terra cotta; providing for additional ventilation. 1 i.

Direct and Indirect Heating Systems in Chicago Civic Opera, by Thomas R. Shaver.
No. 8. August, 1930. p. 683.
Air supply; air filtered; radiation and fans; formal and informal attire a problem; provisions for cooling; courts increase heat loss; boiler plant. 1 i.

Locomotive Smoke Removal Through High Building, by Thomas R. Shaver.
No. 9. September, 1930. p. 743.
Main-line railroad tracks run under Chicago Daily News building; method of removing smoke; expansion chamber; fan provided for, but not used; capacity. 1 i.

Interviews of Interest.
No. 9. September, 1930. p. 778.
Interview with Charles J. Lehn; index chart for steam plant operation in buildings; use of chart; gives accurate picture of proper operation. 1 i.

Practical Piping Problems, by H. L. A.
No. 2. February, 1930. p. 183.
Superheated hot water circulation; lay-out for supplying six buildings by forced circulation; use of injector by Russian engineers; detail of injector fittings in basement of each building. 2 i.

"Open for Discussion."
No. 9. September, 1930. p. 773.
Question and answer relating to "Superheated Hot Water Circulation" (February, 1930, issue) by Edward C. Caton and H. L. Alt; typical problem and solution. 1 i.

Heating and Ventilating Churches, by Samuel R. Lewis.
No. 7. July, 1930. p. 552.
Operation of downward indirect systems; introducing the air; simplicity and complete instructions important; automatic temperature regulation; temperature of incoming air; mixing dampers; trouble from drafts; heating and ventilating church kitchens. 8 i.

"Open for Discussion."
No. 8. August, 1930. p. 671.
Comments on "Heating and Ventilating Churches" (July, 1930 issue) by E. K. Campbell; church heating problem different from any other.

Mechanical Equipment of the $3,000,000 Scottish Rite Cathedral.
No. 11. November, 1930. p. 908.
General description of Scottish Rite Cathedral in Indianapolis, Ind.; problems; boiler plant; stokers and variable drive; stack and breechings; steam piping; vacuum system; radiation; insulation; air supply and exhaust; ducts; control of temperature and humidity; fans used; air conditioning for the pipe organ; sound isolation and absorption; air filtration and filters used; water supply and water heaters. 11 i.

Interviews of Interest.
No. 11. November, 1930. p. 943.
Interview with M. Ehrlich, engineer of Lake-Michigan bldg., Chicago; equipment of building; power plant records; problems of management; overheating expensive; use of records; instruction charts; costs; comparative power plant statement for Jan. to Sept., 1930.

Schools, Colleges, Hospitals

Interviews of Interest.
No. 5. May, 1930. p. 415.
Study of mechanical equipment in schools; interview with Dr. O. F. Ball, president of Nation's Schools Publishing Company; current trends and price indices. ... ...

After Your School Plans Are Made—It Is Worthwhile to Check and Double-check, by H. W. Schmidt.
No. 6. June, 1930. p. 470.
Closer co-operation between engineer and architect needed; apparatus often crowded; supervision of specialties; dangers of over-done "economy"; common troubles; too little radiation; incorrect pitch of piping; improper placing of coils; dirt pockets necessary; training of operators important. 5 i.

Temperature Distribution in Field House at University of Minnesota, by F. B. Rowley.
No. 9. September, 1930. p. 732.
Such structures have peculiar problems; stratification an aid; humidity; the field house; heaters; temperature control; method of making temperature distribution tests; smoke tests; results; conclusions as to correct method of regulations; plans and sections. 6 i.

Cleveland Hospital Addition. by J. Hamilton.
No. 7. July, 1930. p. 589.
Layout of University Hospitals group in Cleveland; new buildings; private pavilion; nurses' dormitory; mechanical problems in hospitals; changes in plans; vacuum heating system, mains welded: compressed air system; ventilation; air filtered; fan capacities; refrigeration; floor area, contents and cost of the three new buildings. 6 i.

Heating—Warm Air

Warm Air and Large Buildings, by E. K. Campbell.
No. 1. January, 1930. p. 12.
Importance of air movement: recirculation; installations in a church, garage, and gymnasium; largest installation (Butler Field House); cotton mill installation; effect of smouldering fire; complete test on Butler Field House. 8 i.

Design of Warm Air Fan Blast Systems for Large Structures, by Platte Overton.
No. 5. May, 1930. p. 386.
Unit and trunk-line systems; ductless system; typical central system; selection of ducts and outlets; detail of outlets; heater size; combustion rate; equivalent of round pipe and branches for equal friction per lineal foot; chart for resistance of air in ducts; casing-in. 4 i.

Many Applications for Direct Fired Hot Blast System in Schools, Public and Industrial Buildings, by Platte Overton.
No. 8. August, 1930. p. 635.
Installation in a high school; 100 per cent outside air required when building was occupied; recirculation for warming up building; humidity; velocities in ducts; operation when school is not in session; system is simple and efficient; details of dampers. 6 i.

Trunk Ducts for the Fan Blast System of Warm Air Heating, by Platte Overton.
No. 11. *November*, 1930. *p.* 923.
Construction of concrete or extended plenum system; velocities; temperature regulation; heat loss in concrete ducts; double ducts; friction loss; placing the warm air and tempered air ducts; elbows and reflectors; an individual duct system. 5 i.

Piping—General

Higher Pressures and Temperatures as They Affect the Design, Installation and Maintenance of Piping, by J. J. Harmon.
No. 12. *December*, 1930. *p.* 985.
Trend of pressures and temperatures; six plants in 1200-1400 lb. range; petroleum industry; hydrogenation; the last decade; effect of high pressure on design; stress in thick walled cylinder; Clavarino's formula; Barlow's formula; curves show ratios; applying formulas to design; allowances for manufacturing limitations and wrench forces; A. S. M. E. Boiler Code formula; use modified formulas with caution; effect of high pressure on wall thickness; working pressures for ordinary metals. 7 i.

Piping—Where Reliability and Compactness Are Essential, by E. W. Sylvester.
No. 3. *March*, 1930. *p.* 192.
Piping systems in submarines; functions; considerations in design; materials used; formula for thickness of tubing; oxygen piping; ventilation pipe and ducts; valves and manifolds; flange connections; sleeve couplings; cone connections. 6 i.

The Iron and Steel Family, by Bryan T. McMinn.
No. 7. *July*, 1930. *p.* 566.
Subject of metallography of interest to piping engineers; wrought iron and steel; theory of corrosion from difference in electrolytic potentials; characteristics of steel; of cast steel; properties of steel measured by carbon content; cold-working; importance of carbon in steel; gray and white cast iron; malleablizing. 13 micrographs.

Predicting the Flow of Liquids in Pipes, by R. E. Gould.
No. 10. *October*, 1930. *p.* 850.
Method of predicting pressure loss coincident with the flow of any fluid through a pipe line; Darcy formula; Reynolds' number; variation of friction factor with Reynolds' number; circulation of water in wrought iron pipe; calcium chloride brine in wrought iron pipe; kinematic fluidity and temperature; effect of changes in temperature and specific gravity on pressure loss. 5 i.

New Alignment Chart for Computing the Pressure Drop Due to the Frictional Resistance of a Flowing Fluid, by Temple C. Patton.
No. 12. *December*, 1930. *p.* 1003.
Effect of heating and cooling in viscous region; specific gravity; velocity; diameter; viscosity; use of chart; typical problems; use of isothermal friction data; choose friction factor with care. 1 i.

Piping Requirements for Vacuum Driers, by Malcolm C. W. Tomlinson.
No. 8. *August*, 1930. *p.* 667.
Equation for radiant and convected heat; determination of constants; heat loss from cast iron radiator in a vacuum; vacuum drier test data; making the test and analyzing the data; per cent radiator output in a vacuum. 3 i.

The Accuracy of the Orifice Meter.
No. 5. *May*, 1930. *p.* 391.
Early use; skill necessary; essential to use with boilers over 200 hp.

Condenser Pumps in Duplicate, by Arthur McCutchan.
No. 6. *June*, 1930. *p.* 496.
Pumps served by common primer; can they be operated at same time or will they buck each other; pumps can be operated together. 1 i.

A Problem on Boiler Horsepower, by H. L. Alt.
No. 6. *June*, 1930. *p.* 544.
Method of heating process water to throw least load on boilers; typical calculations.

Reliable Ink Supply to Newspaper Presses Essential, by J. V. Dodge.
No. 9. *September*, 1930. *p.* 775.
Ink tanks and piping in Chicago Daily News building; forcing ink to presses; supplying kerosene and oil for cleaning and lubricating; elevations of ink, kerosene and oil tanks. 2 i.

Elaborate System of Sound Insulation in Newspaper Building.
No. 9. *September*, 1930. *p.* 765.
Insulating press-room floor to isolate sound; construction; results; special ceiling.

Practical Piping Problems, by W. H. Wilson.
No. 10. *October*, 1930. *p.* 891.
Connecting piping for conveying oxygen; valves; importance of cleaning out oil and grease; blowing out with steam. 1 i.

Chemical Piping Oxy-acetylene Welded from Sheet Aluminum.
No. 11. *November*, 1930. *p.* 904.
Technique of welding aluminum; making elbows.

Interviews of Interest.
No. 8. *August*, 1930. *p.* 725.
Fans and Pipes for Chemical Plant (interview with C. K. Clayton); chamber process used; handling acids; rubber coated fans; steel, rubber-lined tanks, pipe, valves; hard rubber piping; advantages of exchange of information.

Proper Control in Welding Pressure Vessels.
No. 1. *January*, 1930. *p.* 11.
Six factors in proper control; checking welder's ability; qualification test; test specimens. 1 i.

Selection of Material in Welding Pressure Vessels.
No. 3. *March*, 1930. *p.* 217.
Chemical composition of steel for welding; qualities. 2 i.

Welded Pressure Vessels.
No. 3. *March*, 1930. *p.* 225.
Design of shell; formula; head design. 2 i.

Piping—Air

Installation and Care of Air Piping, by A. W. Loomis.
No. 3. *March*, 1930. *p.* 203.
Cost of compressed air; intake piping; effect of intake temperature on efficiency and capacity of compressors; pulsations in conduit; material for conduit; aftercoolers; safe installation of receivers; moisture remaining in saturated air after compression; cleaning receiver and discharge pipe; discharge piping; expansion joints; piping for high air pressures; identification of pipe lines; friction of air in pipes; air filters. 5 i.

Air Piping for Signal and Other Uses in Philadelphia Subway, by Richard H. Borngesser.
No. 8. *August*, 1930. *p.* 653.
Layout and location of main air line; plan of subway; size of pipe and uses; loss of pressure; pressure requirements; installation requirements; supports and guides; service taps; expansion and contraction; bends; drainage reservoirs; anchors; sediment chambers; piping to manifold condensers; piping for compressors. 8 i.

Practical Piping Problems, by W. H. Wilson.
No. 2. *February*, 1930. *p.* 182.
Emergency repairs to compressed air line; method used. 1 i.

Practical Piping Problems, by W. H. Wilson.
No. 1. *January*, 1930. *p.* 91.
Insuring cleanliness of compressed air at Bayuk Cigar plant.

Practical Piping Problems, by W. H. Wilson.
No. 9. *September*, 1930. *p.* 806.
Pipe repairs without shutting off supply; repairs on a compressed air line; method; method applicable to other jobs. 1 i.

Practical Piping Problems, by W. H. Wilson.
No. 11. *November*, 1930. *p.* 983.
An indicator valve for underground pipe lines; installation on 100-lb. air line; making a good joint. 1 i.

Practical Piping Problems, by W. H. Wilson.
No. 1. *January*, 1930. *p.* 91.
Vacuum cleaner for railway cars made from pipe fittings. 1 i.

Piping—Hydraulic

Notes on Hydraulic Power Systems and Piping, by E. W. Sylvester.
No. 7. *July*, 1930. *p.* 579.
Advantages of hydraulic power transmission; use on shipboard; use ashore; pipe sizes; factors of safety; venting; material used for piping; joints; fittings; use of cast steel; cleanliness of system; gages; noise; hydraulic steering gear, capstan; constant displacement pump-accumulator system; sweated brass sleeve coupling; air loaded accumulator. 5 i.

Some Fundamentals of Hydraulic Piping, by Frederick G. Schranz.
No. 3. *March*, 1930. *p.* 229.
Historical notes; working pressures for pipe; laying new lines; dangers of air in high pressure lines; shocks; cooling of exhaust water; freezing.

Piping Engineers Need Information on Hydraulic Equipment, by F. G. Schranz and W. L. DeLaney.
No. 9. *September*, 1930. *p.* 776.
The hydraulic press; capacities of rams at various pressures; applications to industries. 1 i.

Practical Piping Problems, by W. H. Wilson.
No. 10. *October*, 1930. *p.* 890.
Care of hydraulic packing; keeping leathers in good condition; forms for storing leathers; use of braided flax; detail of hydraulic U leather used in connection with flax packing. 4 i.

Practical Piping Problems, by W. H. Wilson.
No. 11. *November*, 1930. *p.* 983.
Proper way to tighten bolts in flanged joints on hydraulic piping; a connection between two hydraulic cylinders. 1 i.

Piping—Oil and Gas

The Design and Installation of Insulating Oil Piping for Electrical Substations, by A. H. Beller.
No. 8. *August*, 1930. *p.* 676.
Loss of oil's dielectric strength; purification apparatus; when installation is warranted; oil piping; properties of three oils used in transformers and circuit breakers; determination of pipe size; loss of head; rates of flow; valves and fittings; use of flexible hose; tight joints important; oil storage system; curve for friction loss in piping; variation of viscosity, specific gravity with temperature; tanks; gages; oil house construction; pumps; piping diagrams; oil hose unit; the purifier. 9 i.

Fuel Oil System for Stand-by Power Plant, by Harold K. Fox.
No. 9. *September*, 1930. *p.* 750.
San Francisco steam plant of Great Western Power company designed to give continuity of service; mechanical atomizing oil burners used; method of operation; pumps operate singly or in series; lay-out of fuel oil system. 1 i.

Practical Piping Problems, by W. H. Wilson.
No. 2. *February*, 1930. *p.* 182.
Oil heater made by welding; simple heater for cold spots in fuel oil line. 1 i.

Practical Piping Problems.
No. 4. *April*, 1930. *p.* 368.
Emergency oil feeding system made by welding from spare parts in oil refinery. 1 i.

An Industrial Gas Heating Installation, by Joseph W. Platt.
No. 7. *July*, 1930. *p.* 587.
Equipment in Alfred Bleyer & Co. plant in Brooklyn, N. Y., manufacturer of paper bags, dishes etc.; capacity; steam pressure used; piping; boiler feed system. 4 i.

Gas Pipe Survey, by J. P. Shotland.
No. 8. *August*, 1930. *p.* 723.
Gas piping in Fein Tin Can Co.; calculation of sizes; lay-out of piping. 4 i.

Testing Pipe Joints.
No. 7. *July*, 1930. *p.* 632.
Testing joints in welded river crossing for gas line. 1 i.

Templet for Bends in Large Pipe.
No. 6. *June*, 1930. *p.* 493.
Templet made from piece of pipe for 20-in. gas line; method of using. 1 i.

Practical Piping Problems, by W. H. Wilson.
No. 12. *December*, 1930. *p.* 1073.
Joints for oil pipe lines; metallic gaskets; screwed joint welded; bolted flange union. 2 i.

Piping—Refrigeration

Piping a Refrigerated Room, by R. C. Doremus.
No. 1. *January,* 1930. *p.* 1.
Factors affecting the piping; three factors of heat gain; formulas for heat transfer; total heat load; calculations for a typical room; producers' and consumers' storage; classes of foods stored; pipe ratio charts for direct expansion and brine systems. 2 i.

Ammonia Pipe Sizes, by R. C. Doremus.
No. 4. *April,* 1930. *p.* 287.
Efficiency of refrigerating plant dependent on piping; computing surface; weight; velocity charts; maximum velocities used. 4 i.

"Open for Discussion."
No. 7. *July,* 1930. *p.* 601.
Flow of fluid in pipe; discussion by John C. Reed and Edgar E. Ambrosius on "Ammonia Pipe Sizes," by R. C. Doremus, in April, 1930, issue; variation of frictional resistance; relation between friction factor and Reynolds' number; University of Illinois to publish bulletin.

The Flow of Superheated Ammonia in One Inch, Extra Heavy, Black, Steel Pipe, by John C. Reed and Edgar E. Ambrosius.
No. 2. *February,* 1930. *p.* 101.
Tests conducted at University of Illinois; object of experiments; factors affecting flow; Reynolds' number; complete description of the test equipment; lay-out of test section; procedure; conclusions; variation of velocity with internal diameter and Reynolds' number; probable relation between friction factor and Reynolds' number of superheated ammonia; example of computing pressure drop. 10 i.

Viscosity of Refrigerants, by John C. Reed and Edgar E. Ambrosius.
No. 6. *June,* 1930. *p.* 455.
Importance of viscosity; theory; units; viscosity of gases; mixed gases; viscosity of saturated ammonia; sulphur dioxide; butane; ethane; carbon dioxide; methyl chloride; ethyl chloride; air; water; curves showing variation of viscosity with temperature; tables; bibliography. 7 i.

Practical Piping Problems.
No. 4. *April,* 1930. *p.* 369.
Notes on ammonia piping; threads; sealing joints; soldering joints; use of red and white lead and litharge.

Low Temperature Insulation as Applied to Piping Systems, by C. T. Baker.
No. 3. *March,* 1930. *p.* 218.
Destructive effects of moisture; causes of air leakage; necessity for clean pipe surfaces; testing for leakage; kind of covering; importance of pipe spacing; supporting pipe lines. 4 i.

Correcting Faulty Design or Construction of Refrigerating Piping, by C. T. Baker.
No. 5. *May,* 1930. *p.* 376.
Waste because of faulty piping not apparent; selection of pipe and fittings; use of extra heavy pipe; choice of return bends; proper spacing to allow for air circulation essential; necessity for care in making joints; cutting pipe; use of litharge and glycerine as joint cement; flange bolts; pipe arrangement important; allowable gas velocities. 4 i.

Causes and Prevention of Corrosion in Refrigeration Piping, by J. A. Day.
No. 11. *November,* 1930. *p.* 926.
Factors influencing corrosion; electrolytic action; refrigeration equipment problems; use of pH method; chemical retarding agents; condenser systems; methods of preventing or retarding corrosion in brine and condenser systems; suggestions for good practice; galvanic corrosion; problems in rayon manufacture. 3 i.

A Storage Plant Refrigeration System, by E. M. Mittendorff.
No. 5. *May,* 1930. *p.* 390.
Egg storage room kept at 30 F and 80 per cent relative humidity; piping arrangement; removal of odors and warm air; general design of refrigeration units. 3 i.

Brine Piping and Its Installation, by Henry Torrance.
No. 7. *July,* 1930. *p.* 632.
Threads; red lead as lubricant; rusting up; air chambers.

Welding Galvanized Iron Pipe.
No. 5. *May,* 1930. *p.* 452.
Coils welded complete previous to galvanizing sometimes possible; welding galvanized iron with steel welding rod; bronze-welding galvanized iron pipe. 5 i.

Canadian Cold Storage Plant Uses Quick Freezing, by Albert E. Macdonald.
No. 7. *July,* 1930. *p.* 593.
General description of Halifax Ocean Terminals; facilities offered fishing industry; power plant; fish processing; precooling facilities. 8 i.

Coolers Maintain Uniform Temperatures.
No. 12, *December,* 1930. *p.* 1017.
Two units in cold rooms at Bowman Dairy Co., Chicago; keep 85 tons of milk at 40 F; supplement pipe coils; automatic valve defrosts units; even temperatures maintained. 4 i.

Piping—Steam (Including Steam for Process Work)

Design

Economical Steam Pipe Sizes for Heating, Process and Power Steam, by A. W. Moulder.
No. 8. *August,* 1930. *p.* 639.
Method for sizing pipe a balance between the theoretical and practical; verified by usage; comparison of textbook, rule-of-thumb, and practical methods; factors to consider; tables giving pounds weight of steam carried in pipe from ⅜ to 24-in. diameter for drops per foot from .0001 to .0080 lb.; the tables explained.

Economical Steam Pipe Sizes for Heating, Process and Power Steam, by A. W. Moulder.
No. 9. *September,* 1930. *p.* 751.
Sizing pipe for typical industrial heating system (unit heaters and radiators); lay-out; method of calculation; system explained in detail and applicable to many pipe-sizing problems; tables for pounds of steam flowing in pipe for drops per foot from .0081 to .0250 lb. 3 i.

Economical Steam Pipe Sizes for Heating, Process and Power Steam, by A. W. Moulder.
No. 10. *October,* 1930. *p.* 828.
Sizing piping for heating systems such as used in hotels, offices, stores, etc.; typical calculations; pounds of steam carried in pipe for drops per lineal foot of .0255 to .0800 lb.; sizing pipe for an upfeed system. 2 i.

Economical Steam Pipe Sizes for Heating Process and Power Steam, by A. W. Moulder.
No. 11. *November,* 1930. *p.* 898.
Conversion tables for sizing pipe for high pressure steam; example worked out in detail for a combination process and heating system; effect of insulation; fundamentals of sizing power plant piping; typical example; tables for flow of steam in pipe for drops per lineal foot of .0810 to 1.000 lb. 2 i.

The Design of Piping to Secure Flexibility, by Arthur McCutchan.
No. 9. *September,* 1930. *p.* 739.
High pressures and temperatures given new interest in former "theoretical" problems of piping; thermal expansion; a boiler feed line; inlet piping to economizer; grapho-analytical method applied to heating system supply line; relations between horizontal and vertical forces; bending moments. 9 i.

Designing and Constructing Expansion Bends, by G. W. Hauck.
No. 7. *July,* 1930. *p.* 557.
Uses of bends; factors to consider; amount of expansion; types of bends; type to use; installing bends for a high pressure steel pipe header; 600-ft. steel pipe line; a two-boiler job; expansion cared for by bends; drips and drains; location of anchors; lengths of pipe available for bends. 5 i.

"Open for Discussion."
No. 11. *November,* 1930. *p.* 937.
Discussion on "Designing and Constructing Expansion Bends" (July, 1930, issue) by Sabin Crocker; expansion of U bends; coefficient of expansion for steel pipe; expansion values of bends; thrust at anchor points; cold springing; effect of pipe wall thickness; flattening of circular cross-section of curved pipe; end connections; relation between deflection and reacting force for expansion bend; change in modulus of elasticity with temperature; bending moment at joints. 4 i.

Factors Affecting Trap Capacity, by T. H. Ren.
No. 1. *January,* 1930. *p.* 33.
Flow through straight-edge orifice; discharge through an orifice; effect of flash steam; two classes of trap installations; pipe connections to traps; importance of selecting traps on a pounds per minute basis; receiver separator with trap. 2 i.

Drips and Drains, by G. W. Hauck.
No. 4. *April,* 1930. *p.* 305.
Drains and drips for power plant piping important; draining steam line to auxiliaries; draining headers; tapping gate valves; size of drip pockets; welded drip pockets. 5 i.

Pressure Reducing Valves, by Sabin Crocker.
No. 1. *January,* 1930. *p.* 20.
(Also see p. 416, May, 1930 issue.)
Principles of operation; direct acting pressure regulator; pilot operated pressure regulator; service pressure range of; selection of proper size regulator; capacity of pressure regulators; method of computing discharge capacity; care required in selecting regulators; pressure reducing station with two regulators in parallel. 4 i.

"Open for Discussion."
No. 5. *May,* 1930. *p.* 416.
Sizing pressure regulators (discussion on "Pressure Reducing Valves, p. 20, January, 1930 issue); comparison of safety valves and pressure reducing valves; velocities in each; method of computing lift, etc.

"Open for Discussion."
No. 12. *December,* 1930. *p.* 1033.
Discussion on "Pressure Reducing Valves" (January, 1930, issue), by H. Marcq; variations in reduced pressure; valve lift; information necesary about valve; admissible variation; characteristics inherent to other modulating devices.

A Brief Review of Pipe Standardization.
No. 12. *December,* 1930. *p.* 1030.
Standards prior to 1920; sectional committee; subcommittees; purpose of American Standards Association; standardization on national scale.

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An Easily-Made Pipe Bender.
No. 1. *January,* 1930. *p.* 89.
Emergency method of bending two-inch pipe; machine made of fittings around plant. 4 i.

How to Weld Wrought Iron Pipe.
No. 4. *April,* 1930. *p.* 317.
Properties of wrought iron; method of welding.

Practical Piping Problems, by W. H. Wilson.
No. 1. *January,* 1930. *p.* 91.
Steam heating coil connections without steam trap or return line. 1 i.

Heat Balance and Toasting "Luckies"—With a Description of the Piping, by A. W. Moulder.
No. 2. *February,* 1930. *p.* 93.
Method of obtaining heat balance; piping for high pressures and temperatures; description of American Tobacco Co. plant; nozzle construction in 12-in. header; adjusting header assembly vertically. 6 i.

Piping for Economy and Service, by B. M. Conaty.
No. 2. *February,* 1930. *p.* 119.
Plant expansion of Shawinigan Chemicals, Ltd.; 3,500 ft. high pressure welded steam line; steel structures, supports, etc., made on the job; test of line. 2 i.

Cooler-Humidifier for Producer Gas, by Linn B. Bowman.
No. 3. *March,* 1930. *p.* 215.
Simple means devised to transfer sensible heat in producer gas to primary air blast, using the steam generated in prime movers; construction and operating details; test of; corrosion. 1 i.

Practical Piping Problems, by W. H. Wilson.
No. 2. *February,* 1930. *p.* 182.
Installing branch connection to steam line; method used necessitates minimum time of shut-down. 1 i.

Steam, Water, Air and Oil Piping for Railroad Yards.
No. 3. March, 1930. p. 210.
Piping requirements in railroad yards; supporting lines; draining underground piping; securing water pipe in concrete pit; joints in cast-iron conduit; expansion and contraction; table for expansion of pipe; air-operated car retarders; frost protection of water lines; snow melting coils; corrosion in nipples; valves. 16 i.

Practical Piping Problems, by W. H. Wilson.
No. 3. March, 1930. p. 279.
Drip for boiler feed line; useful when repair work is being done. 1 i.

High Pressure Fittings Inspected with Transportable X-Ray Equipment, by Ancel St. John and Herbert R. Isenburger.
No. 5. May, 1930. p. 410.
Castings inspected on jobs; apparatus used; time for inspection; what the tests show; correcting defects; principal undesirable conditions. 4 i.

Practical Piping Problems, by W. H. Wilson.
No. 6. June, 1930. p. 543.
Controlling supply to long steam line; piping; method of operation. 1 i.

Steam Header Connections.
No. 7. July, 1930. p. 577.
Arrangement of reducing valves delivering steam to 12 in. heating main in building of Chicago Produce Co. 1 i.

How to Pipe a Steam Kettle to Prevent Air-Binding, by E. M. Mittendorff.
No. 8. August, 1930. p. 666.
Diagram for piping steam jacketed kettle; sudden inlet of steam will not cause hammering. 1 i.

Repairing an Air-Bound Drying Table, by E. M. Mittendorff.
No. 11. November, 1930. p. 936.
Steam table for drying asphalt paper air-bound; symptoms; method of correcting. 1 i.

Temperature Control on Paraffine Paper Machines, by E. M. Mittendorff.
No. 5. May, 1930. p. 402.
Keeping paraffine bath at certain temperature; addition of paraffine melting tank cut down consumption and number of operators; lay-out. 1 i.

Practical Piping Problems, by W. H. Wilson.
No. 8. August, 1930. p. 722.
Many economies through proper installation of piping in industrial plants; some losses; preventing losses through traps; leaking boiler blow-off valves; waste in feedwater heater; drip valves for pumps and engines. 1 i.

Practical Piping Problems, by W. H. Wilson.
No. 9. September, 1930. p. 805.
Replacing gaskets; cleanliness of faces important; tightening bolts; piping must be installed properly; facing flanged joint of screwed type. 1 i.

Piping to Heat High Viscosity Oil for Gas Manufacture with Exhaust Steam, by Harry E. Hodgson.
No. 11. November, 1930. p. 917.
Heating device outside storage tanks heats oil; pump regulates flow; capacity and temperatures; lay-out of system; advantages. 2 i.

Trap Installation for Process Work, by T. H. Rea.
No. 2. February, 1930. p. 108.
Batch and continuous process heating; high and low pressure traps on same job; continuous process work; four general types; draining cylinder driers; multi-unit heaters; trap size required; steam condensed per ft. of bare pipe; condensation from submerged steam coils; draining jacketed kettles; six-roll flat work ironer; continuous and header coils; pressure and condensate variation in batch process work. 12 i.

"Open for Discussion."
No. 6. June, 1930. p. 494.
Demand for steam with jacketed kettles; air handling capacity of trap important. (Also see "Trap Installation for Process Work," p. 108, February, 1930 issue.)

Trap Installation and Operation, by T. H. Rea.
No. 3. March, 1930. p. 223.
Preventing steam binding; gravity drainage not imperative; accessibility of traps; bypasses; test cocks; testing traps; condensation of steam in traps; use of check valves; dirt in traps; dirt pocket. 5 i.

Steam Trap Prevents Valve Trouble.
No. 3. March, 1930. p. 207.
Drain pocket and trap placed ahead of stop valve supplying steam to reducing valve; reducing pressure by stages.

Trap Troubles, by T. H. Rea.
No. 4. April, 1930. p. 318.
Common troubles and remedies; pressure too high; no water coming to trap; trap may be filled with dirt; trap may be air-bound; mechanical condition of trap; trap may be too small; dirt or scale may prevent trap from closing; bucket-drained cylinder; loss of prime through sudden pressure drop. 3 i.

Steam Trap Records Pave Way to Savings, by T. H. Rea.
No. 6. June, 1930. p. 475.
Records of equipment essential to economies; system applicable to all steam equipment; trap card; repair parts card; use of records; inspection and repairs; charges to each trap; prorating inspection time; instances of savings made. 4 i.

Practical Piping Problems, by W. H. Wilson.
No. 4. April, 1930. p. 368.
Location of steam supply valve for high steam pipe coils; eliminates use of ladder. 1 i.

Practical Piping Problems, by W. H. Wilson.
No. 5. May, 1930. p. 453.
Indicators for valves made from spare parts; indicators necessary for proper operation; operating valve two hundred feet from hand-wheel. 2 i.

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Condensate from Heating System Used as Hot Water Supply for Building, by R. M. McQuitty.
No. 9. September, 1930. p. 762.
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"Open for Discussion."
No. 12. December, 1930. p. 1034.
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Practical Piping Problems, by W. H. Wilson.
No. 3. March, 1930. p. 279.
Strainers for water supply lines; installation; cleaning. 1 i.

Practical Piping Problems, by W. H. Wilson.
No. 7. July, 1930. p. 631.
Cross-connections for sprinkler system; emergency water connection to boilers; blowing out hydraulic pipe lines. 2 i.

Practical Piping Problems, by W. H. Wilson.
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Sleeve for repairing water mains; method of repairing underground water mains. 1 i.

Figuring Pressure and Temperature Drop in a Hot Water Piping System, by P. M. Greenwell.
No. 12. December, 1930. p. 1001.
How to figure temperature drop in a 500-ft. hot water line for a hospital; effect of insulation; size of pipe; choosing economical size pump. 3 i.

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Comments on editorial "The Association for Correlating Thermal Research" (May, 1930 issue), by John Howatt; value of Association.

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Interviews of Interest.
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